

CLAIMS

WE CLAIM:

- [c1] 1. A tissue expansion apparatus comprising:
- a base section;
 - a hinge assembly coupled with the distal region of the base section having two hinge assembly arms extending in the distal direction;
 - a plurality of tissue expansion members;
 - an actuating assembly (comprising an actuating member and an actuation plate) for the application of a force perpendicular to the central axis of the base section on a tissue expansion member; and
 - a coupling system for engaging the tissue expansion members to the actuation plate; and
 - a coupling system for engaging the tissue expansion members to the base section for simultaneous outward movement of the tissue expansion members relative to the central axis of the base section.
- [c2] 2. The apparatus of claim 1, wherein the coupling system is offset from the central longitudinal axis.
- [c3] 3. The apparatus of claim 1, wherein the base section includes an actuation channel along a longitudinal axis passing completely through the base section on the distal face for accommodating the actuation plate.
- [c4] 4. The apparatus of claim 3, wherein the base section includes a base aperture along the longitudinal axis beginning at the proximal end of the base section and terminating in the actuation channel.
- [c5] 5. The apparatus of claim 4, wherein the base section includes a hinge assembly having a hinge assembly aperture in each hinge assembly arm along the transverse axis with respect to the actuation channel.

[c6] 6. The apparatus of claim 5, wherein each tissue expansion member includes a plurality of apertures for coupling each tissue expansion member to the hinge assembly and actuation plate.

[c7] 7. The apparatus of claim 1, wherein the coupling system further comprises a hinge pin enabling the coupling of each tissue expansion member to the hinge assembly and a plurality of coupling pins enabling the coupling of each tissue expansion member to the actuation plate.

[c8] 8. The apparatus of claim 7, wherein each tissue expansion member is coupled to the hinge assembly arms at the hinge assembly aperture by the hinge pin passing transverse to the central axis of the apparatus.

[c9] 9. The apparatus of claim 8, wherein the actuating member is coupled to the actuation plate.

[c10] 10. The apparatus of claim 9, wherein the actuation plate includes a plurality of actuation plate apertures.

[c11] 11. The apparatus of claim 10, wherein the actuation plate apertures are oval.

[c12] 12. The apparatus of claim 11, wherein each tissue expansion member is coupled to the actuating plate at said actuation plate aperture by a coupling pin.

[c13] 13. The apparatus of claim 9, wherein the actuating member is fixed to the actuation plate.

[c14] 14. The apparatus of claim 1, wherein the base section includes retention fins enabling a coupling of a catheter tube to the base section.

[c15] 15. The apparatus of claim 1, wherein the base section includes a mounting set channel enabling a coupling of a catheter tube to the base section.

[c16]

16. The apparatus of claim 1, wherein the actuating member and actuation plate are placed within the base aperture and actuation channel respectively allowing movement of the actuation assembly within said base section.

[c17]

17. The apparatus of claim 1, wherein the shape of the tissue expansion members is modifiable.

[c18]

18. A method of vascular micro-dissection comprising;
placing a tissue expansion apparatus in the proximity of a vascular occlusion wherein the tissue expansion apparatus comprises a base section, a hinge assembly coupled with distal region of the base section having two hinge assembly arms extending in the distal direction, an actuating assembly, and a plurality of tissue expansion members, wherein each actuation assembly includes an actuating member and an actuation plate for the application of a force perpendicular to the central axis of the base section on each tissue expansion member;
coupling the tissue expansion members to the base section;
coupling the tissue expansion members to the actuating assembly;
applying a force along the longitudinal axis of the tissue expansion apparatus to the actuating assembly, wherein the force simultaneously rotates the tissue expansion members outward relative to the longitudinal axis of the tissue expansion apparatus;
and
disrupting the vascular occlusion in response to the force.

[c19]

19. The method of claim 18, further comprising enabling the passage of a guide-wire or other intervention device through a dissection tract produced by the tissue expansion apparatus.

[c20] 20. The method of claim 18, wherein disrupting includes tearing the vascular occlusion.

[c21] 21. The method of claim 18, wherein disrupting includes fracturing the vascular occlusion.

[c22] 22. The method of claim 18, wherein disrupting includes separating the vascular occlusion from the vasculature wall.

[c23] 23. The method of claim 18, wherein disrupting includes separating vessel wall tissue and creating a dissection tract within the vessel wall.

[c24] 24. The method of claim 18, further comprising placing the tissue expansion apparatus near the occlusion by guiding the tissue expansion apparatus via a guide-wire.

[c25] 25. The method of claim 18, wherein the coupling further comprises placing the actuation assembly within the base section allowing longitudinal movement of the actuating assembly relative to the base section.

[c26] 26. The method of claim 18, wherein placing the tissue expansion apparatus further comprises the coupling of the tissue expansion apparatus to a catheter tube.